

Amendments to and Listing of the Claims:

Please amend claim 1 so that the claims read as follows:

1. (Currently Amended) A polymer electrolyte fuel cell comprising a unit cell composed of a first polymer electrolyte membrane, a cathode and an anode each having a catalyst reaction layer and disposed across said polymer electrolyte membrane, a separator having a means for supplying a fuel gas to said anode, a separator having a means for supplying an oxidant gas to said cathode, a current collector plate, an insulating plate and an end plate, said fuel cell further comprising a total heat exchanger for concurrently moving heat and humidity from a discharged gas toward said fuel gas and oxidant gas ~~being installed inside the end plates disposed on both ends of said polymer electrolyte fuel cell, or between said insulating plate and either said current collector plate or said end plate,~~
said total heat exchanger comprising a second polymer electrolyte membrane placed between two sheets of carbon paper whose external sides are sandwiched between two plates,
said total heat exchanger effecting total heat exchange and humidification via said a second polymer electrolyte membrane, ~~which is the same as that constituting said unit cell and has a thickness of 25 μm or less.~~

2. (Cancelled).

3. (Cancelled).

4. (New) The polymer electrolyte fuel cell according to claim 1, wherein the first and second polymer electrolyte membranes are the same.

5. (New) The polymer electrolyte fuel cell according to claim 1, wherein the second polymer electrolyte membrane has a thickness not exceeding about 50 μm .

6. (New) The polymer electrolyte fuel cell according to claim 1, wherein the second polymer electrolyte membrane has a thickness not exceeding 25 μm .

7. (New) The polymer electrolyte fuel cell according to claim 1, comprising a plurality of said unit cells and a plurality of said total heat exchangers installed inside the end plates disposed on both ends of said polymer electrolyte fuel cell to form a fuel cell stack.

8. (New) The polymer electrolyte fuel cell according to claim 1, wherein the two plates of the total heat exchanger each have a gas flow channel therein.

9. (New) The polymer electrolyte fuel cell according to claim 1, wherein the total heat exchanger is installed inside the end plates disposed on both ends of said polymer electrolyte fuel cell.

10. (New) The polymer electrolyte fuel cell according to claim 1, wherein the total heat exchanger is installed between said insulating plate and said current collector plate.

11. (New) The polymer electrolyte fuel cell according to claim 1, wherein the total heat exchanger is installed between said insulating plate and said end plate.